DIAGNOSIS OF 3D OCEAN MOTIONS IN THE FIRST 500M AND OF THEIR CONSEQUENCES ON TRACERS AND BIOLOGY USING SWOT OBSERVATIONS

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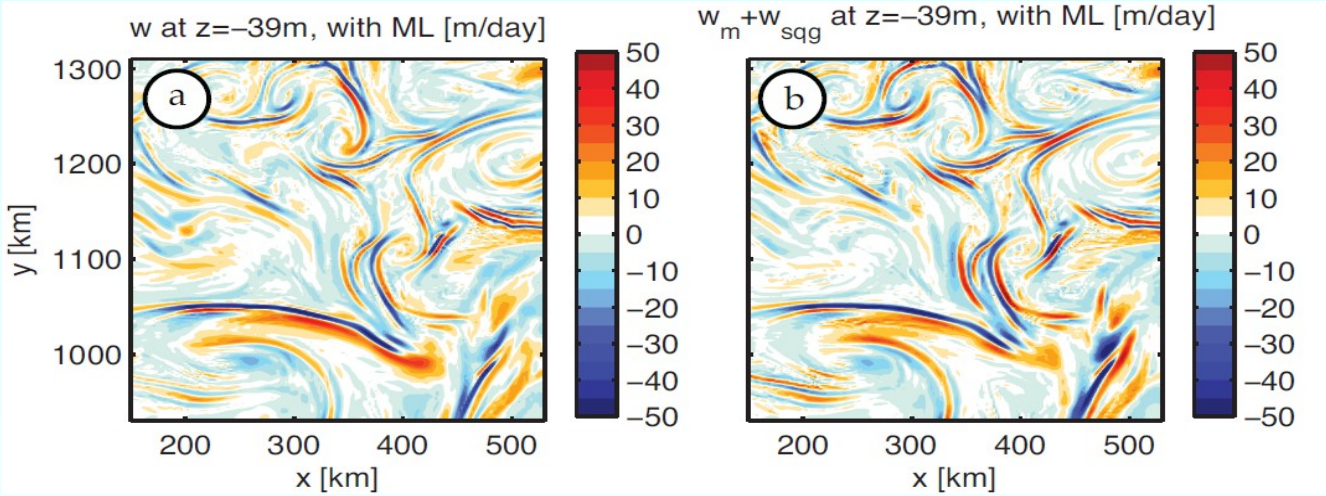
I – Proposed Research

- **Develop a methodology to diagnose the 3D ocean dynamics (10-300km) in the first 500m from H.R. SSH (SWOT) and other L.R. data (Argo, ...)**
- **Assess the impact of the methodology on the estimation of the 3D tracer dispersion and the biological system**

Results already obtained:

Such methodology has been tested but only in specific regions (Gulf Stream, Kuroshio, A.C.C.) using SQG framework + M.L. mixing parameterization (Lapeyre and Klein, 2006 ; Klein et al., 2009 ; Ponte et al., 2013)



Observed **Reconstructed**

II - Specific Objectives and Approach in the next years

Specific objectives :

* Extend the existing diagnosis methods to other regions where SQG dynamics do not work well (eastern regions of oceanic basins, ...) ;

* Extend existing diagnosis methods to winter regimes (when the mixed-layer depth is large) ;

* Assess the interactions between submesoscale dynamics and internal tides in regions where the kinetic energy of internal tides is equal or larger than that of mesoscale eddies (see Chavanne and Klein, 2010) => consequences on HR SSH interpretation.

Approach :

* Use of both, realistic and idealized, very high resolution simulations with theoretical guidelines ;
* Collaboration with other groups : (1) B. Qiu (UH), (2) H. Sasaki (Jamstec), (3) J. Richman, B. Arbic, J. Shriver (NRL), (4) P.Y. Le Traon (Mercator), (4) B. Chapron (Ifremer,IPSL)

III - Addressing the key Phase-A SWOT issues

* What are the smallest dynamical scales necessary to represent the 3D ocean dynamics as a function of latitude (using the same methodology as in Levy et al., 2012) ;

* How to use the synergy between SWOT data and existing lower resolution data (conventional altimeters, Argo floats,...) to improve the diagnosis of 3D ocean dynamics (extending the study from Pujol et al., 2012) ;

* Impact of SWOT strategy on the estimation of 3D tracer dispersion and of the biological system.